

SNS STANDARD VACUUM CONTROL SYSTEM CONCEPTUAL DESIGN REVIEW

Tuesday April 18, 8:00 – 4:00

A combination “PLC standardization workshop” and “vacuum control system conceptual design review” was held April 18, 2000 at the SNS Building, 701 Scarboro Rd., Oak Ridge, TN, Room 101A.

Attendees included the following persons:

John Hammonds, ANL (via phone + NetMeeting)
Rich Reidel, ANL
John Smith, BNL
Johnny Tang, BNL
Dave Gurd, LANL
Kay Kasemir, LANL
Bob Dalesio, LANL
Bob Weiss, LANL
Steve Lewis, LBNL (via phone + NetMeeting)
Bill DeVan, ORNL
Mike Hechler, ORNL
John Munro, ORNL
Mike Hechler, ORNL
Paul Wright, ORNL
John Cleaves, ORNL
Bill Stone, ORNL

Vacuum-control-system-relevant highlights from the design review / workshop are presented below.

1. Johnny Tang presented information on (a) PLC development activities at BNL and (b) the control system architecture BNL is advocating for vacuum controls. Excerpts of the slides are attached. Comments on the slides follow:

PLC Architecture Standards R/D Conducted at BNL: A PLC software development lab has been set up at BNL to help establish PLC hardware and software standards for SNS. These PLC standards will apply to the vacuum control system (as well as other SNS control systems).

Three Allen-Bradley PLC models have been evaluated: The SNS “Integrated Controls Working Group” (ICWG) is advocating the use of Allen-Bradley ControlLogix PLCs.

Link IOC and PLC over Ethernet for real-time control: At least two methods of communications between vacuum control system PLCs and IOCs are being advocated for SNS: (1) ethernet “Control and Information Protocol” (CIP) and (2) ControlNet. Johnny Tang concluded that A-B support for CIP was too limited at this time to pick it as a standard. So BNL is proposing using the ControlNet interface.

Three types of RS485 link modules are under evaluation: Since most vacuum instrumentation has an RS-232/485 interface, these links are vital to supervisory control of vacuum equipment.

The consensus was that PLC-based RS-232/485 interfaces had the problem of introducing yet another development environment. The consensus was that we should use the IOC for RS-232/485 interfaces. The PLC interface should be relegated to discrete and analog I/O.

A vacuum instrumentation interface prototype control system is planned to be implemented. This is perhaps the most important slide of the review, as it shows the most-favored vacuum control system architecture. The consensus of the group was that this should be the model for the SNS standard vacuum control system architecture.

Bob Dalesio emphasized that the IOC driver for the RGA should be written. At LEDA, operations originally said they didn't need to interface with the RGA but ultimately they did have to. The program that they love to see is nothing more than a plot of the different gases that are present.

Plan for ControlNet EPICS support: Development of the ControlNet driver is still in progress. It will have to be completed to support vacuum controls.

2. Mike Hechler presented the latest on vacuum equipment standardization. Of particular interest was equipment that the control system has to interface with. Tables of equipment are attached.

Bob Dalesio noted that a fast ion gage interlock (<15msec response time) may be required by linac RF controls.

3. Bill DeVan presented a table showing available interfaces to a variety of vacuum equipment that has been proposed for SNS (e.g. in cost estimates). This table is attached. As can be seen, RS-232 / RS-485 interfaces predominate as the field bus connection to this equipment.

CONCLUSIONS:

Adopt Johnny Tang's network architecture as our standard, with the following change: Add discrete I/O connection from PLC to ion pump controller and turbo pump controller.

Assume a ControlNet interface between vacuum control system PLCs and IOCs. We will continue to keep an eye on the ethernet "Control and Information Protocol" and maybe transition to it if it happens soon enough.

PLC Architecture Standards / Vacuum Control System CDR Agenda:

Time	Activity	Presenter
8:00	Coffee & bagels	
8:30	Intro / Purpose of meeting	Gurd
	Inter-PLC Architecture Discussions:	
8:45	BNL PLC lab	Tang
9:00	Target Test Facility (TTF) control system	Battle
9:15	LANL experience / linac hot model	Weiss
9:30	BNL PLC plans (for vac. sys., P.S., R.F., etc.)	Tang / Smith
9:45	LANL PLC plans (for vac. sys., P.S., R.F., etc.)	Weiss?
10:00	ORNL Target PLC plans	Battle
10:15	Break	
10:30	ControlNet demonstration	Tang
11:00	Advantages / disadvantages of ControlNet A-B I/F	Tang
11:15	Advantages / disadvantages of Ethernet A-B I/F	Kasemir
11:30	Ethernet vs. ControlNet discussion & consensus	
	Fieldbus Architecture Discussions:	
12:00	SNS vacuum standardization efforts (and interfaces offered by the preliminary set of standard equipment)	Hechler / DeVan
12:30	Vacuum system control architecture discussion & consensus	Tang / Gurd / etc.
1:15	Lunch (provided on-site) (Delayed because Dalesio and Kasemir have to leave at this time)	
1:45	Role of DeviceNet, FlexIO, Foundation Fieldbus	Battle?
2:30	Wildcard: Options are: - schedule slip - follow-on discussions - other PLC-related information attendees want to make known - SNS conventional facilities plans - SNS PLC standards	
3:30	Summarize	
4:00	Adjourn	